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BIOLOGICAL EVALUATION OF SOUTHERN PINE BEETLE ON THE NATIONAL FORESTS IN MISSISSIPPI

by

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ABSTRACT

An aerial survey and ground check for southern pine beetle (SPB) was conducted on 620,209 acres of national forest land in Mississippi from July - September 1980. The forests had the following estimated number of spots, acres of host type, and spots/1000 acres host type, respectively.

Tombigbee NF - 47; 63,028; 0.75/1000
Holly Springs NF - 25; 89,057; 0.28/1000
Bienville NF
Bienville RD - 33; 74,053; 0.45/1000
Strong River RD - 15; 70,618; 0.21/1000
Homochitto NF
Homochitto RD - 15; 84,125; 0.18/1000
Bude RD - 35; 86,546; 0.40/1000

Forest Insect and Disease Management (FI&DM) recommends SPB suppression projects be continued on the Holly Springs NF, the Tombigbee NF, and the Bienville RD. Activity on these forests has decreased since last year, but remains at levels such that direct control procedures should still be considered. FI&DM recommends SPB suppression projects be discontinued for the Strong River, Homochitto, and Bude RD's.

INTRODUCTION

In July, August, and September biological evaluations were conducted on the Tombigbee, Homochitto, Bienville, and Holly Springs National Forests in Mississippi.

The evaluations were conducted by personnel of Forest Insect and Disease Management (FI&DM), State and Private Forestry, Alexandria, Louisiana Field Office.

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The purpose of the evaluation was to determine the current status of southern pine beetle, Dendroctonus frontalis Zimmerman, populations on the forest and to determine what action, if any, would be necessary in FY 81.

The schedule for ground checking was:

Tombigbee NF	July 14 - 17
Bienville NF	July 21 - 24
Bienville RD	
Strong River RD	
Holly Springs NF	August 11 - 14
Homochitto NF	
Homochitto RD	August 25-- 27
Bude RD	September 8 - 11

METHOD OF EVALUATION AND ANALYSIS OF SPB INFESTATION

Aerial Survey and Ground Checks

Standard aerial sketch map procedures were used for this evaluation, except that survey coverage was 100 percent[2/]. The presuppression surveys were made by district personnel and spots of red and/or fading trees were recorded and plotted on Forest Service Class A maps. Spots were stratified by size class. Spots were selected randomly for ground checking proportionate to size class distributions.

Numbers of vacated and infested trees, basal area, age, height, and percentage of the stand in sawtimber were recorded.

Decisions to continue or discontinue a SPB suppression project were based on the following criteria:

- Number of SPB spots/1000 acres of host type

  This figure provides an indication of current levels of SPB activity. Historically, 1 multiple tree SPB spot/1000 acres of host type has been considered the lower threshold of an epidemic outbreak. However, 1 or more multiple tree spots/1000 acres of host type does not always require that SPB suppression be undertaken. This is the case when the majority of the spots are small, involving minimal timber losses, and individual spots are likely to become inactive.

- Green tree:red tree ratios

  These ratios give an indication of SPB activity at the time of ground check, but are of limited value in predicting future losses.

2/ Detection of Forest Pests in the Southeast, 1970. USDA, Forest Service, Southeastern Area, State and Private Forestry, Publ. S&PF-7, Atlanta, GA. 51 pp.

- Additional timber loss in each spot for the 30 day period following ground check

  This quantity is calculated by using a formula developed by the Texas Forest Service (Billings and Hynum 1980). The number of spots showing additional timber loss was used to determine whether SPB losses would continue. A large number of spots on a district become relatively unimportant if they will not involve additional timber losses.

- Volume currently infested

  This figure is used to calculate the volumes threatened and protected. As the volume of timber currently infested with SPB increases, the economic benefits from a SPB suppression project also increase.

- Entomological judgement

  Professional experience and field observations from the ground checked spots are used to interpret and supplement the technical data to reach a final decision.

TOMBIGBEE NF

Results

Aerial Survey and Ground Checks

A total of 47 multiple tree spots exist on the Tombigbee NF. Ground checks determined that SPB was the causal agent. Spots ground checked ranged from 16 trees to approximately 3 acres in size. Of the 15 spots ground checked only one was inactive. One spot was not included in the analysis because data was incomplete due to logging activity. The number of infested trees ranged from 3-133 with an average of 31 trees. Ground check data is summarized in Table 1. Figure 1 shows the areas of heaviest southern pine beetle infestation.

There is a total of 63,028 acres of SPB host type on the Tombigbee NF with a mean of 0.75 SPB spots/1000 acres host type.

Trend

Nine of the 13 active spots included in the analysis were predicted to have additional timber loss during the 30 day period following ground checks (Billings and Hynum 1980). During the period 264 additional trees were predicted to be lost.

Table Summary of Ground Check Data for Tombigbee Natic Forest, Mississippi, July 1980.

	Total No. Trees	No. Vacated Trees		No. Infested Trees			Additional Spot Growth Loss[a]	% Infested	Green:Red Ratio	Total BA	Age	Ht. (ft.)	Site Index	%Saw-Timber
		Total	Red & Faders	Total	Greens	Reds & Faders								
Ackerman Unit														
1.	111	68	52	43	36	7	21	39	0.61:1	110	40	65	75	10
2.	239	106	87	133	96	37	130	56	0.77:1	170	25	40	75	0
3.	18	15	14	3	0	3	0	17	0:1	90	60	65	60	80
4.	59	26	24	33	27	6	17	56	0.90:1	120	45	80	85	70
5.	26	2	2	24	15	9	9	92	1.36:1	100	60	55	55	60
6.	20	11	7	9	7	2	0	45	.78:1	110	40	60	60	60
7.	113	54	14	59	47	12	60	52	1.81:1	170	40	75	85	75
8.	16	11	11	5	3	2	0	31	0.23:1	90	35	50	60	60
9.	25	11	11	14	3	11	2	56	0.14:1	100	30	45	60	50
10.	64	37	26	27	13	14	7	42	0.33:1	80	35	65	80	75
Sub-Total	691	341	248	350	247	103	246	-	-	-	-	-	-	-
Mean	69	34	25	35	25	10	25	49	.69:1	114	41	60	70	54
Trace Unit														
1.	49	27	21	22	12	10	7	45	0.38:1	100	45	100	105	100
2.	INACTIVE													
3.[b]	43	16	16	27	12	15	[b]	63	[b]	60	30	70	95	[b]
4.	74	48	17	26	15	11	11	35	.54:1	110	25	75	115	75
5.	37	34	18	3	2	1	0	8	0.11:1	80	25	70	110	40
Sub-Total	160	109	56	51	29	22	18	-	-	-	-	-	-	-
Mean[c]	53	36	19	17	10	7.0	6	29	o.34:1	97	32	82	110	72
Overall Total	851	450	304	401	276	125	264	-	-	-	-	-	-	-
Overall Mean[c]	65	35	23	31	21	10	20	44	0.61:1	110	39	65	79	58

[a] Additional number of trees lost over 30 days during summer. Based on formula ATK=[(0.000202 IAT x TBA) - 0.2211] x 30 (Billings and Hynum 1980).

[b] 3 acre spot, being logged at time of ground check; data not included in totals since it was incomplete.

[c] Means are based only on active spots.

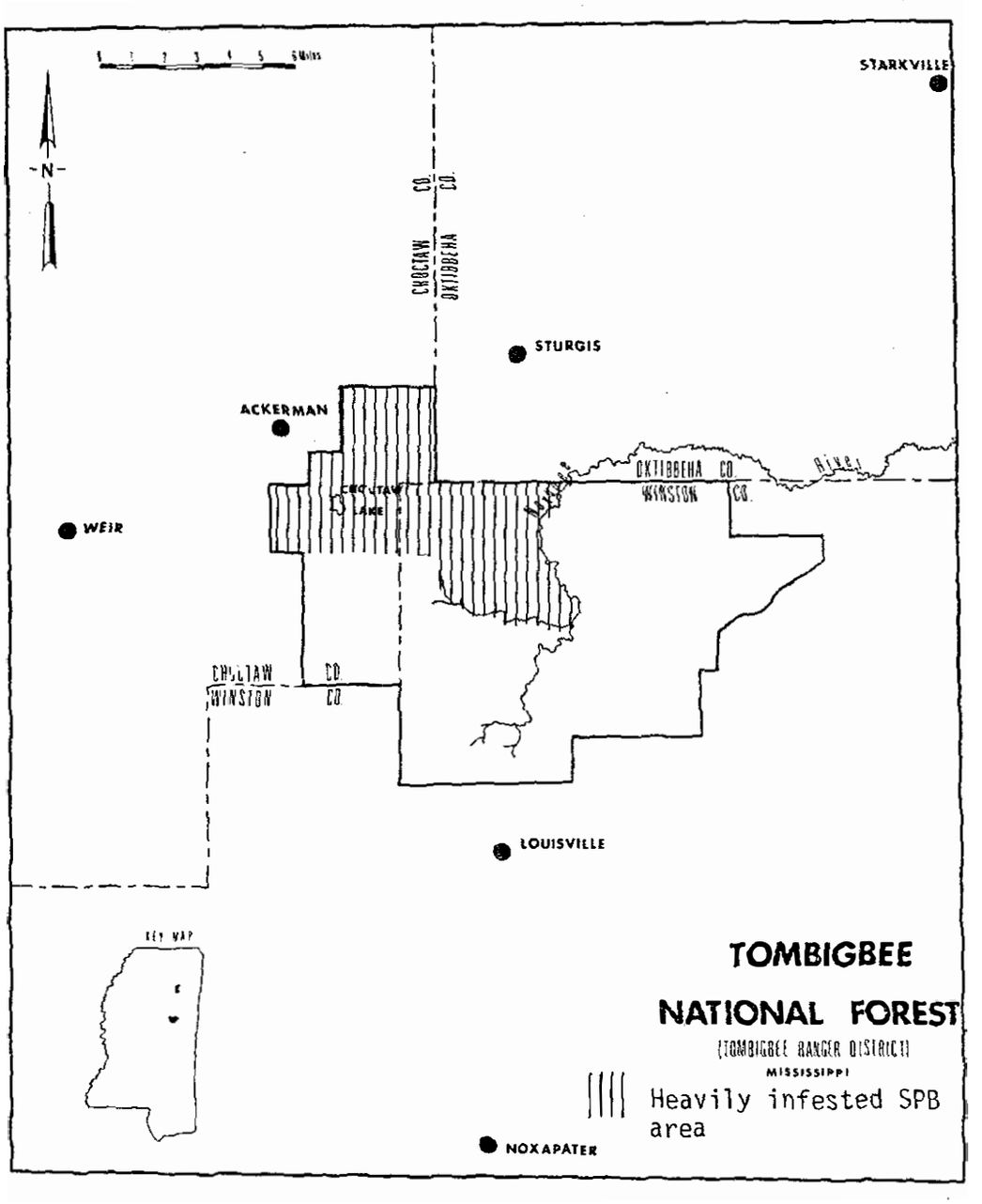

Figure 1. Location of heaviest southern pine beetle activity.

Volume Infested, Threatened, and Protected

There is 306 MBF of timber currently infested distributed in age classes 25 - 60. If the SPB suppression project were discontinued the potential exists for an additional 1308 MBF loss during the next year. If the suppression project were continued it is predicted 899 MBF would be protected.

Discussion

SPB activity on the Tombigbee NF has decreased since last year. Low green:red ratios and relatively small numbers of brood observed in infested trees indicate FY 81 losses should be less than FY 80. However, due to 1) the volume of timber currently infested, 2) the present trend indicating that losses should continue, and 3) the hot dry conditions throughout Mississippi that have stressed trees and increased potential for SPB spot growth and proliferation in FY 81, it is recommended that the SPB suppression project be continued. A project will minimize losses and prevent spot growth by removing infested material from the forest. Recommended SPB control alternatives are discussed on pages 18-19.

HOLLY SPRINGS NF

Results

Aerial Survey and Ground Checks

A total of 25 multiple tree spots were recorded from the aerial survey. Ground checks determined that SPB was the causal agent. Ten spots were ground checked and the data is summarized in Table 2. Spots ranged in size from 58 - 608 trees with a mean of 242 trees. All spots ground checked were active and the number of SPB infested trees ranged from 1 - 166 with an average of 70 trees per spot. A total of 89,057 acres of host type exist on the forest with a mean of 0.28 spots per 1,000 acres (host type). Figure 2 shows the areas of heaviest SPB infestation.

Trend

Predictions of additional trees killed within 30 days after ground check indicate that 8 out of 10 spots should involve additional timber losses (Billings and Hynum 1980). During this period 479 additional trees were predicted to be lost.

Volume Infested, Threatened, and Protected

There is an estimated 324.5 MBF of timber currently infested distributed in age classes 30 - 60 years. If the SPB suppression project were discontinued the potential exists for an additional 2,784 MBF loss during the next year. If the suppression project were continued it is predicted 2,088 MBF loss would be protected.

Table 2. Summary of Ground Check Data for Holly Springs National Forest, Holly Springs, Miss., August, 1980.

	Total Trees	No. Vacated Trees		No. Infested Trees			% Infested	Additional Spot Growth Loss[a/]	Green:Red Ratio	Total BA	Age	Ht.(ft.)	Site Index	%Saw-Timber
		Total	Red & Faders	Total	Green	Red & Faders								
1.	58	57	42	1	1	0	2	0	0.02:1	140	30	30	45	0
2.	126	99	87	27	16	11	21	8	0.16:1	90	59	70	65	70
3.	142	81	40	61	47	14	43	60	0.87:1	180	40	47	55	30
4.	608	442	226	166	109	57	27	84	0.39:1	90	50	55	55	50
5.	174	58	48	116	41	75	67	85	0.33:1	130	45	79	80	70
6.	223	161	128	62	17	45	28	31	0.10:1	100	59	74	70	70
7.	323	256	256	67	17	50	21	42	0.06:1	120	55	75	70	80
8.	236	230	200	6	1	5	3	0	0.01:1	180	30	55	80	35
9.	129	59	53	70	34	36	54	82	0.38:1	210	40	37	45	10
10.	404	285	282	119	69	50	29	87	0.21:1	130	40	60	70	60
Total	2423	1728	1362	695	352	343	-	479	-	-	-	-	-	-
Mean	242	173	136	70	35	34	29	48	0.25:1	137	45	58	64	48

a/ Additional number of trees lost over 30 days during summer. Based on formula ATK=[(0.000202 IAT x TBA) - 0.2211] x 30 (Billings and Hynum 1980).

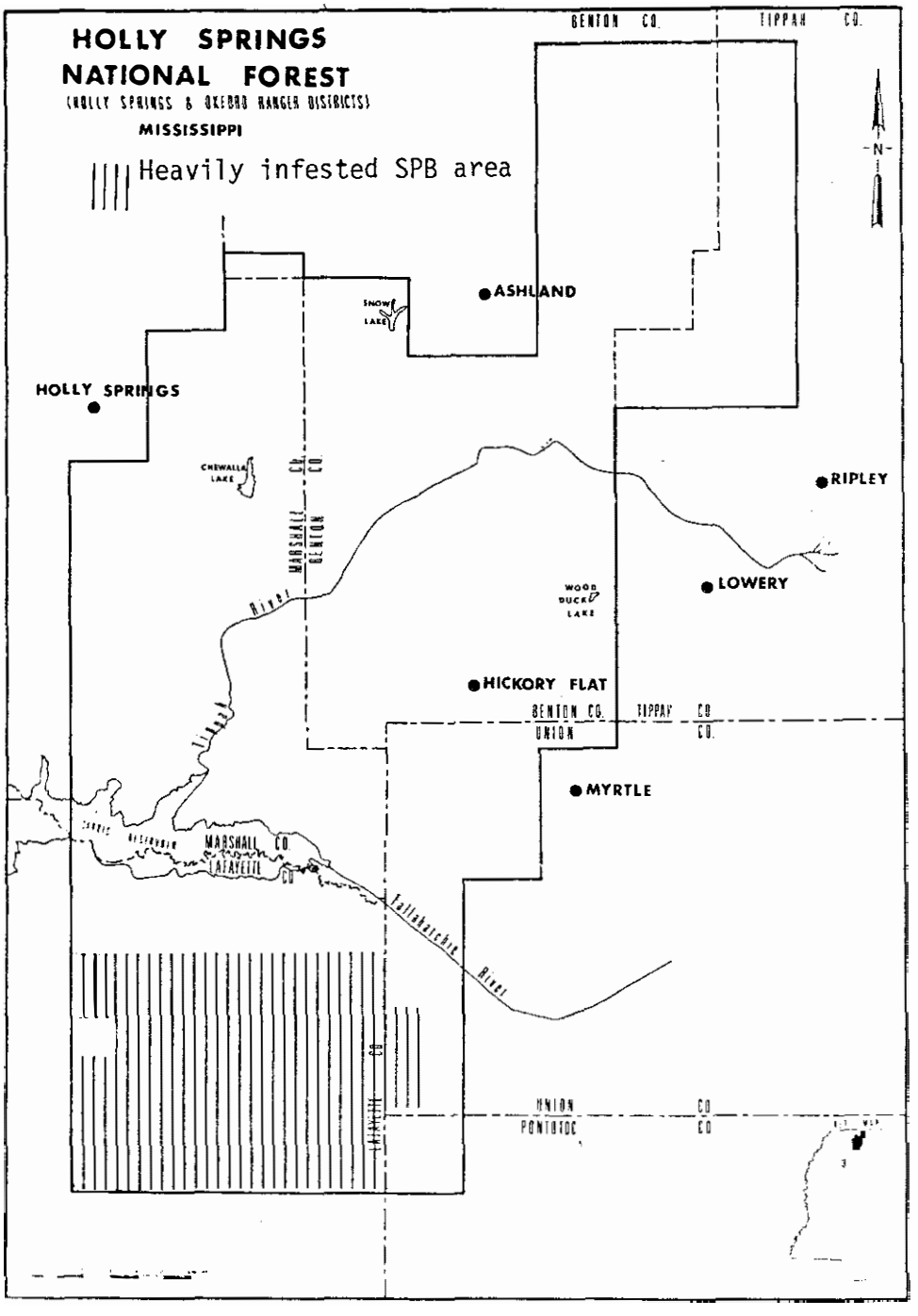

Figure 2. Location of heaviest southern pine beetle activity.

Discussion

SPB activity on the Holly Springs NF has decreased since last year. Low green:red ratios and relatively small numbers of brood observed in infested trees indicate FY 81 losses should be less than FY 80. However, due to 1) the volume of timber currently infested, 2) the present trend indicating that losses should continue, and 3) the hot dry conditions throughout Mississippi that have stressed trees and increased potential for SPB spot growth and proliferation in FY 81, it is recommended that the SPB suppression project be continued. A suppression project will minimize losses and prevent spot growth by removing infested material from the forest. Recommended SPB control alternatives are discussed on pages 18-19. It should be noted that this forest has a history of and a present problem with Fomes annosus (Fr.) Cke. root rot. This disease has been shown to be an agent in predisposing pine stands to SPB attack. Salvage cutting in high hazard annosus root rot areas greatly increases the opportunity for the root rot to become colonized in the freshly cut stumps. Therefore, the susceptibility of infection to the residual stand is greatly enhanced due to root grafts with these stumps. While biologically it may be desirable to prevent the spread of Fomes annosus, there have been no economic thresholds established to determine when control measures should be undertaken. Since the distinctive conks of annosus root rot cannot always be found in infected stands, the following precautionary measures should be considered in high hazard sites. When possible, treat the freshly cut stumps of the buffer strip with: 1) borax if annosus root rot is not suspected to be present at the time of salvage or, 2) a solution containing the competing fungus Phlebia gigantea (Fr.) Donk (formerly Peniophora gigantea).[3/]

Another alternative is to conduct thinning and salvage operations during the summer months. Tree stumps cut during the period of May through August and below 34°N latitude do not have to be treated with either of the above materials. This is because few spores are formed during this period and high temperatures often kill spores that are produced. For further details consult the project control plan.

BIENVILLE NF

Bienville RD

Results

Aerial Survey and Ground Checks

A total of 33 multiple tree spots exist on the Bienville RD. Ground checks determined that SPB was the causal agent. Spots ground checked ranged from 12 - 199 trees. Of the 11 spots ground checked only one was inactive. The

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3/ Commercially available from: Bio-Basic, P.O. Box 5668, Raleigh, NC 26707

number of infested trees ranged from 1 - 97 with an average of 35 trees. Ground check data is summarized in Table 3. Figure 3 shows the areas of heaviest southern pine beetle infestation.

There is a total of 74,053 acres of SPB host type on the Bienville RD with a mean of 0.45 SPB spots/1000 acres host type.

Trend

Of the 10 active spots ground checked 9 were predicted to have additional timber loss during the 30 day period following ground checks (Billings and Hynum 1980). During this period 171 additional trees were predicted to be lost.

Volume Infested, Threatened, and Protected

There is 249 MBF of timber currently infested distributed in age classes 35 - 55 years. If the SPB suppression project were discontinued the potential exists for an additional 1064 MBF loss during the next year. If the control project were continued it is predicted 665 MBF would be protected.

Discussion

SPB activity on the Bienville RD has decreased since last year. Low green:red ratios and relatively small numbers of brood observed in infested trees indicate FY 81 losses should be less than FY 80. However, due to 1) the volume of timber currently infested, 2) the present trend indicating that losses should continue, and 3) the hot dry conditions throughout Mississippi that have stressed trees and increased potential for SPB spot growth and proliferation in FY 81, it is recommended that SPB suppression project be continued. A project will minimize losses and prevent spot growth by removing infested material from the forest. Recommended SPB control alternatives are discussed on pages 18-19.

Strong River RD

Results

Aerial Survey and Ground Check

Seventy multiple tree spots were recorded during the aerial survey. Only 15 of these were thought to be active. Ground checks determined that SPB was the causal agent. A total of 70,681 acres exist on the district with an average of 0.21 spots/1000 acres (host type). Only 2 of 9 spots ground checked were found to be infested and contained a total of 6 active trees.

Discussion

Due to the low number of active SPB spots FI&DM recommends that the southern pine beetle suppression project for the Strong River RD be discontinued. At this time, SPB activity is at a very low level on the district. However, hot dry conditions throughout Mississippi this year have stressed trees and increased the potential for SPB spot growth and proliferation in FY 81. Therefore, it is recommended that FI&DM personnel

Table 1 Summary of Ground Check Data for Bienville Range District, Bienville National Forest, Miss., July, 1980.

	Total No. Trees	No. Vacated Trees		No. Infested Trees			% Infested	Additional Spot Growth Loss[a]	Green:Red Ratio	Total BA	Age	Ht.(ft.)	Site Index	%Saw-Timber
		Total	Reds & Faders	Total	Green	Red & Faders								
1.	122	60	40	62	47	15	51	35	0.85:1	110	40	75	85	60
2.	108	70	30	38	25	13	35	26	0.58:1	140	45	80	85	70
3.	28	11	10	17	10	7	61	15	0.59:1	130	45	69	75	50
4.	47	27	27	20	13	7	43	7	0.38.1	110	49	70	70	80
5.	96	56	32	40	28	12	42	18	0.64:1	100	48	76	75	60
6.	199	102	44	97	57	40	49	52	0.68:1	100	46	80	85	70
7.	39	12	12	27	19	8	69	10	0.95:1	100	44	72	75	80
8.	64	31	23	33	32	1	52	5	1.33:1	60	38	72	80	80
9.	INACTIVE		-	-	-	-	-	-	-	-	-	-	-	-
10.	12	11	11	1	0	1	8	0	0:1	130	58	75	70	70
11.	41	28	17	13	7	6	32	3	0.3:1	120	36	65	80	75
Total	756	408	246	348	238	110	-	171	-	-	-	-	-	-
[b]Mean	76	41	25	35	24	11	44	17	0.63:1	110	45	73	78	70

[a] Additional number of trees lost over 30 days during summer. Based on formula ATK=[(0.000202 IAT x TBA) - 0.2211] x 30 (Billings and Hynum 1980).

[b] Means are based only on active spots.

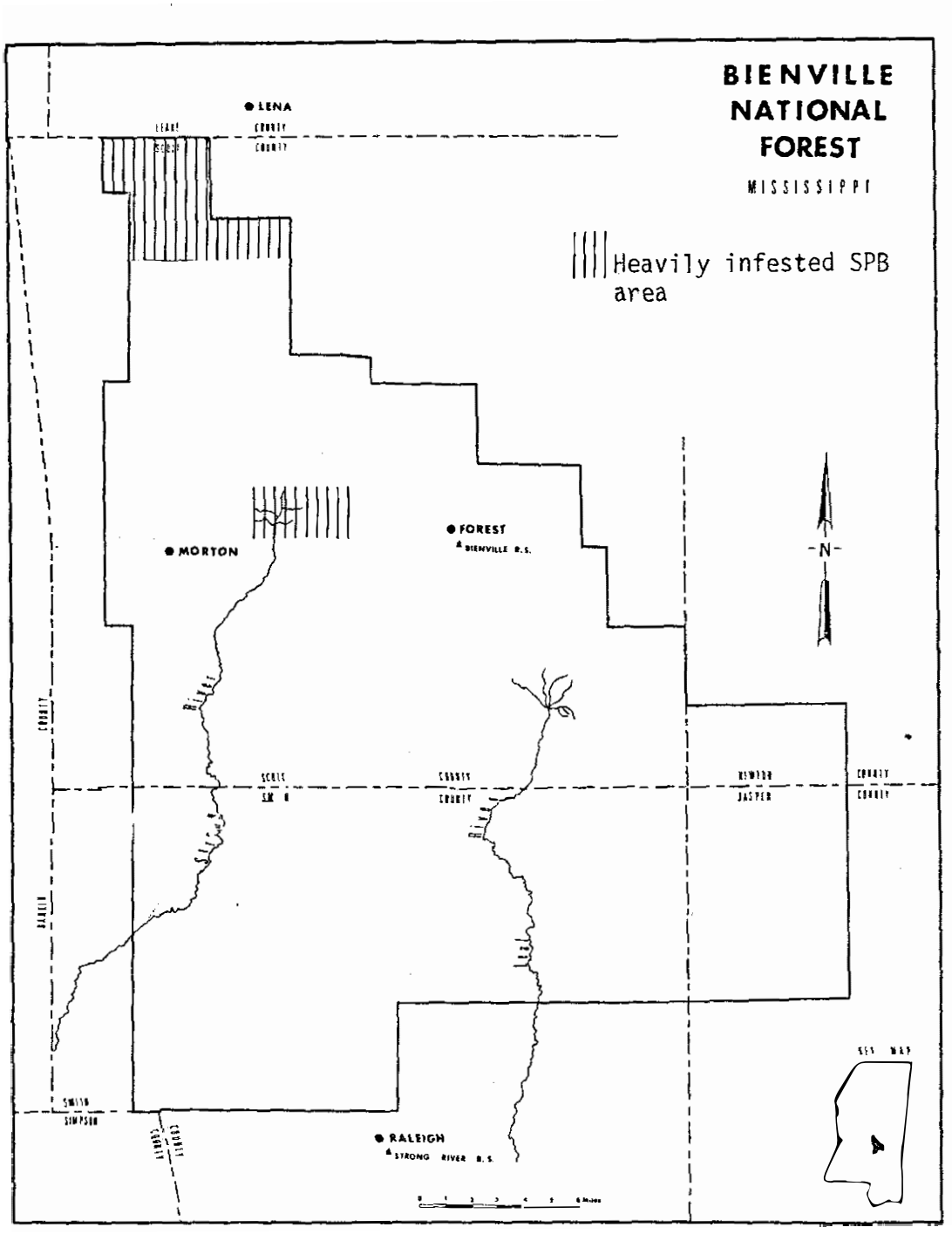

Figure 3. Location of heaviest southern pine beetle activity.

from the Doraville Field Office fly a detection flight in the spring and late summer on this district. Communications with FI&DM (Alexandria Field Office, Pineville, LA 71360; telephone FTS 497-7280, or commerical 318/473-7280) should continue periodically to evaluate any changes in SPB populations.

HOMOCHITTO NF

Homochitto RD

Results

Aerial Survey and Ground Checks

A total of 22 multiple tree spots exist on the Homochitto RD. Ground checks determined that SPB was the causal agent. Nine of these spots are being reserved as study plots for a SPB spot growth special project. Only 15 spots were used in determining spots/1000 acres host type and the volume calculations, since 7 of the 9 special project spots had been observed on previous flights. These would have been salvaged before the evaluation if a special project were not being conducted. Of the 9 spots ground checked 2 were inactive. Spots ground checked ranged from 3 - 74 trees. The number of infested trees ranged from 2 - 37 with an mean of 11 trees. Ground check data is summarized in Table 4. Figure 4 shows the areas of heaviest southern pine beetle infestation.

There is a total of 84,125 acres of SPB host type on the Homochitto RD with an average of 0.18 spots/1000 acres host type.

Trend

Of the 7 active spots ground checked only 2 were predicted to have additional timber loss during the 30 day period following ground checks (Billings and Hynum 1980). During this period 21 additional trees were predicted to be lost.

Volumes Infested, Threatened, and Protected

There is 27 MBF of timber currently infested distributed in age classes 15 - 55 years. Due to the small amount of volumes infested no attempt was made to calculate volumes threatened and protected.

Discussion

The volume currently infested, number of spots/1000 acres host type, and green:red ratios are all low and the trend indicates few additional trees will be lost. Therefore, it is recommended that the SPB suppression project for the Homochitto RD be discontinued. At this time, SPB activity is at very low levels on the district. However, hot dry conditions throughout Mississippi this year have stressed trees and increased the potential for SPB spot growth and proliferation in FY 81. Therefore, it is recommended that FI&DM personnel from the Doraville Field Office fly

Table 4. Summary of Ground Check Data for Homochitto Ranger District, Homochitto National Forest, Miss., August, 1980.

	Total No. Trees	No. Vacated Trees		No. Infested Trees			Additional Spot Growth Loss[a]	% Infested	Green:Red Ratio	Total BA	Age	Ht.(ft.)	Site Index	%Saw-Timber
		Total	Red & Faders	Total	Green	Reds & Faders								
1.	74	37	31	37	37	0	16	50	1.19:1	100	15	40	100	0
2.	42	38	30	4	3	1	0	10	0.10:1	80	21	45	85	20
3.	31	21	3	10	6	4	0	32	0.86:1	90	40	90	100	77
4.	INACTIVE													
5.	15	8	8	7	3	4	0	47	0.25:1	110	12	30	90	0
6.	51	33	13	18	10	8	5	35	0.48:1	110	50	120	120	100
7.	24	22	11	2	1	1	0	8	0.08:1	80	55	100	95	100
8.	3	1	0	2	1	1	0	67	1.00:1	50	35	75	90	80
9.	INACTIVE													
Total	240	160	96	80	61	19	21	-	-	-	-	-	-	-
[b] Mean	34	23	14	11	9	3	3	36	.57:1	89	33	71	97	54

[a] Additional number of trees lost over 30 days during summer. Based on formula ATK=[(0.000202 IAT x TBA) - 0.2211] x 30 (Billings and Hynum 1980).

[b] Means are based on active spots.

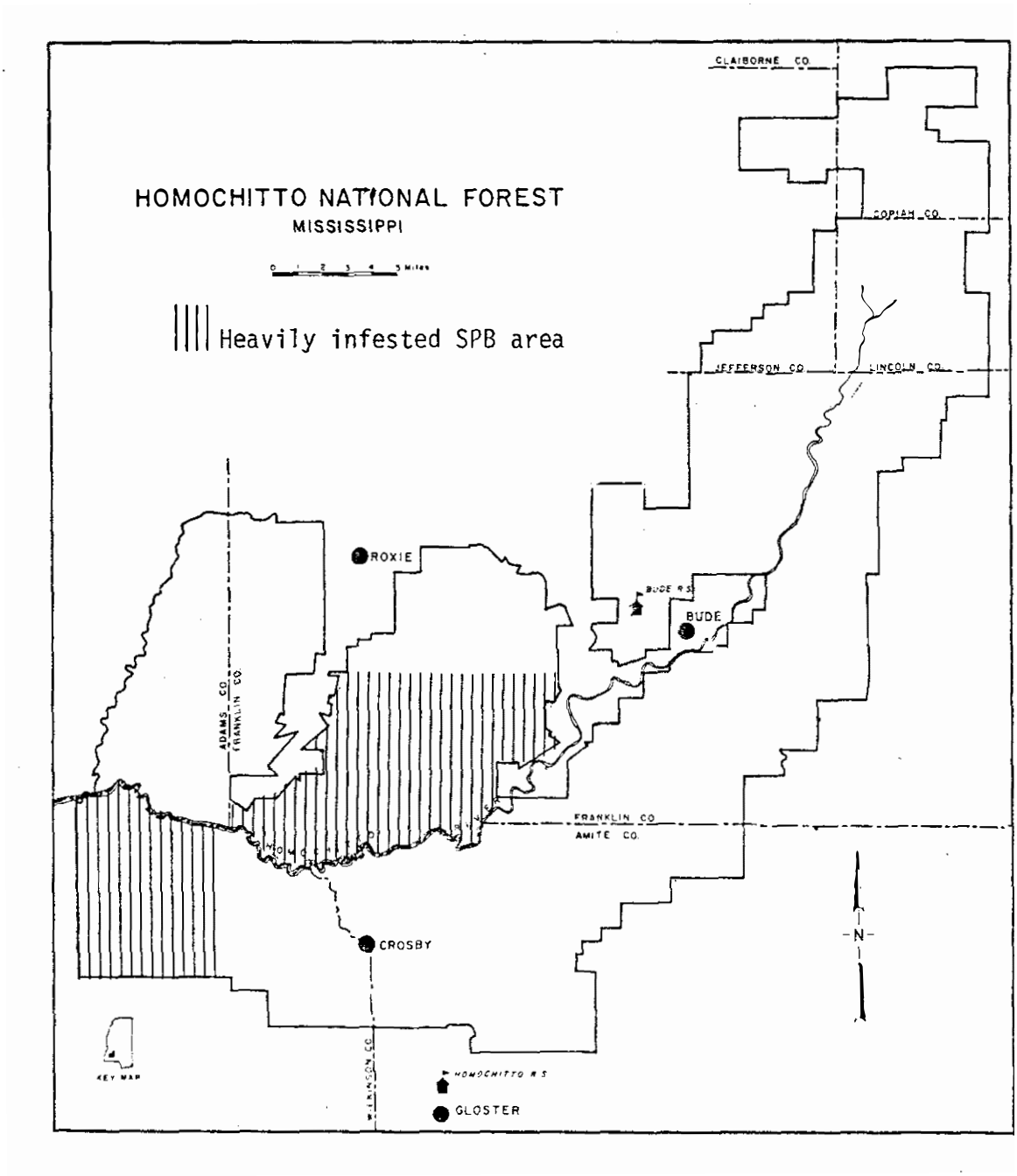

Figure 4. Location of heaviest southern pine beetle activity.

a detection flight in the spring and late summer on this district. Communications with FI&DM (Alexandria Field Office, Pineville, LA 71360; telephone FTS 497-7280, or commercial 318/473-7280) should continue periodically to evaluate any changes in SPB populations.

Bude RD

Results

Aerial Survey and Ground Checks

A total of 35 multiple tree spots exist on the Bude RD. Ground checks determined that bark beetles were the causal agent. Spots ground checked ranged from 1 - 5 trees. Of the 10 spots ground checked, 4 were active SPB and 6 were inactive. Ips activity was present in 5 spots, 3 spots were exclusively Ips and 2 spots were a combination of Ips and SPB. The number of SPB infested trees ranged from 1 - 5 with an average of 3 trees. Ground check data is summarized in Table 5.

SPB spots were distributed throughout the District. There is a total of 86,546 acres of SPB host type on the Bude RD with an average of 0.40 spots/1000 acres host type.

Trend

Of the 4 active SPB spots ground checked none were predicted to have additional timber loss during the 30 day period following ground checks (Billings and Hynum 1980).

Volume Infested, Threatened and Protected

There is 11.5 MBF of timber currently infested distributed in age classes 25 - 50 years. Due to the small amount of volume infested, volumes threatened and protected were not calculated.

Discussion

The volume currently infested, number of spots/1000 acres host type, and green:red ratios are all low and the trend does not indicate losses will increase. Therefore, it is recommended that the SPB suppression project for the Bude RD be discontinued. At this time, SPB activity is at very low levels on the district. However, hot dry conditions throughout Mississippi this year have stressed trees and increased the potential for SPB spot growth and proliferation in FY 81. Therefore, it is recommended that FI&DM personnel from the Doraville Field Office fly a detection flight in the spring and late summer on this district. Communications with FI&DM (Alexandria Field Office, Pineville, LA 71360; telephone FTS 497-7280, or commercial 318/473-7280) should continue periodically to evaluate any changes in SPB populations.

Table 5. Summary of Ground Check Data for Bude Ranger District Homochitto National Forest, Miss., September, 1980

	Total No. Trees	No. Vacated Trees		No. Infested Trees			% Infested	Additional Spot Growth Loss[a]	Green:Red Ratio	Total BA	Age	Ht.Ft.	Site Index	%Saw Timber
		Total	Red & Faders	Total	Greens	Reds & Faders								
1.	INACTIVE [c]													
2.	INACTIVE													
3.	INACTIVE													
4.	INACTIVE [c]													
5.	5	0	0	5	2	3	100	0	.67:1	150	45	89	95	60
6.	4	2	2	2	0	2	50	0	0	130	25	59	95	60
7. [c]	1	0	0	1	0	1	100	0	0	110	50	122	125	100
8.	INACTIVE [c]													
9.	INACTIVE													
10. [c]	4	0	0	4	0	4	100	0	0	140	30	94	125	90
Total	14	2	2	12	2	10	350	0	-	-	-	-	-	-
[b] Mean	4	.5	.5	3	.5	3	88	0	.16:1	133	38	91	110	78

[a] Additional number of trees lost over 30 days during summer. Based on formula ATK=[(0.000202 IAT x TBA) - 0.2211] x 30 (Billings and Hynum 1980).

[b] Means are based only on active spots.

[c] *Ips* galleries were found in these spots.

ALTERNATIVES FOR SOUTHERN PINE BEETLE CONTROL

Four alternatives are recommended for southern pine beetle control. The following discussion briefly outlines these alternatives (Swain & Remion). For a more detailed description on conducting control procedures in a southern pine beetle suppression project refer to the Project Control Plan.

Alternative 1. Remove trees through salvage.

Salvage is the method most often used for stopping the growth of existing spots. This strategy involves removing a buffer strip of noninfested trees, all green infested and red infested trees, and if desired, the trees already killed by the beetles. Costs associated with removing uninfested trees are not charged to specifically designated SPB Project Control Funds since removing uninfested material is not needed for successful control even though it may be operationally desirable. The buffer strip should surround the recently attacked trees. It should be 40 to 70 feet wide for most active spots, while a 100-ft. strip (and occasionally larger) may be needed for large rapidly expanding spots. As a rule, the width of the buffer should not exceed the average height of the trees in the spot. The SPB spot should be carefully surveyed and all trees to be removed should be marked.

To implement this alternative the buffer strip should be cut first. All infested trees should be cut next. Vacated trees are cut last and are removed only for utilization purposes. All trees should be felled toward the center of the spot. The reason for this is to keep infested trees as far away from noninfested trees as possible. This reduces the chance of beetles killing additional trees.

Alternative 2. Piling and burning.

Unmerchantable or inaccessible southern pine beetle infestations can be suppressed by cutting, piling, and thoroughly charring the bark of infested trees. The entire bark surface must be thoroughly charred to insure effective control. The order of priority for cutting, piling, and burning infested trees, particularly large spots, is the same for Alternative 1. Cutting a buffer strip is not recommended. To reduce the possibility of "breakouts", every effort should be made to locate and treat all green infested trees during the piling and burning operation.

Alternative 3. Cut-and-leave infested trees.

This is accomplished by felling a buffer strip and all infested trees toward the center of the spot. The purpose is to stop spot growth. Use of this method causes beetles to disperse at a time of year when this behavior is unnatural. This results in a reduction of mass attacked trees and spot growth ceases. Cut-and-leave should only be used in the summer (May 1 - September 30), since these are the only months beetles

are not dispersing. It should only be used on small spots, normally 50 infested trees or less.

Alternative 4. Chemically treat infested trees.

In this method, infested trees are felled toward the center of the spot, cut into workable lengths, and sprayed with lindane or Dursban® 4E. The purpose of this method is to kill the beetle population. To be effective, all bark surfaces must be sprayed. This involves turning the logs which becomes more difficult as tree size increases.

Forest Insect and Disease Management, Pineville, La., should be contacted prior to the extensive use of chemical control for an update on latest restrictions or application procedures.

PREVENTIVE MEASURES

The preceeding represents only short-term, immediate control strategies. Preventive measures must be taken to help ward off further southern pine beetle infestations in noninfested stands. Some of the more significant preventive measures include:

1. Preventing or minimizing annosus root rot. This is a condition which weakens trees predisposing them to beetle attack.

2. Harvesting mature and overmature stands. Such stands are vulnerable to beetle attack and should be harvested as soon as possible after rotation age is reached.

3. Thinning stagnated stands. Overstocked stands are low in vigor and are more likely to be attacked. Basal areas in excess of 120 sq. ft./acre should be avoided and these stands thinned as heavily as R-8 guidelines allow.

4. Minimizing impact of natural disturbances which causes stand stress. These factors include ice, wind, hail, animal damage, flooding, erosion, poor soil fertility, etc. Corrective measures include removal of individually damaged trees, wholesale salvage, improving drainage, fertilization, etc.

5. Minimizing or eliminating man-caused disturbances. Logging, pipeline, powerline construction, and other construction activities require use of heavy equipment which causes tree skinning and soil compaction that significantly weakens trees. Efforts to minimize the damaging consequences of these activities can significantly reduce the possibility of their leading to southern pine beetle problems.

6. Matching species to site. Off-site plantations seldom achieve vigorous growth necessary to deter attacking beetles. Conversion of hardwood sites to pine also adds the additional stress of hardwood competition.

PRECAUTIONARY PESTICIDE USE STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key--out of reach of children and animals--away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid inhalation of pesticide sprays or dusts; wear protective clothing.

If your hands become contaminated with a pesticide, wash them immediately with soap and water. In case a pesticide is swallowed or gets in the eyes, follow the first aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly. After handling or spraying pesticides, do not eat or drink until you have washed with soap and water.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicide from equipment, do not use use the same equipment for insecticides or fungicides that you used for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary landfill dump, or crush and bury them in a level, isolated place.

NOTE: Some states have restrictions on the use of certain pesticides. Check your state and local regulations. Also, because registrations of pesticides are under constant review by the U.S. Department of Agriculture, consult your county agricultural agent or state extension specialist or FI&DM to be sure the intended use is still registered. For further information or assistance, contact Forest Insect and Disease Management, Alexandria Field Office, Pineville, La. 71360, (phone FTS 497-7280, or commercial 318/473-7280).

REFERENCES

Billings, R. F. & B. G. Hynum. 1980. Southern pine beetle guide for predicting timber losses from expanding spots in east Texas. Texas Forest Service. 2 p.

Swain, K. M. & M. C. Remion. Direct control methods for the southern pine beetle. USDA Ag. Handbook (in press).